Perception of Risk for Older Adults: Differences in Evaluations for Self versus Others and across Risk Domains

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Abstract: BACKGROUND AND OBJECTIVES: Proxy decision-making may be flawed by inaccurate perceptions of risk. This may be particularly true when older adults are the targets of the decisions, given the pervasive negative stereotypes about older adults. METHODS: In study 1, individuals aged 18- to 87 years (as target persons) as well as one of their close social partners (as informants) reported on the risks they perceived for the target person in various life domains. Study 2 additionally explored potential differences in how people make risky decisions on behalf of younger and older adult targets. Younger (age 18-35 years) and older (age 60-81 years) adults (as target persons of the risk evaluations) as well as informants reported on risk perceptions and the likelihood of risk-taking for health, financial, and social scenarios concerning the target persons. Congruence between self-rated and informant-rated risk perceptions and risk-taking were computed on a dyadic as well as a group level. RESULTS: Informants' risk perceptions were positively associated with the risks their partners perceived for themselves. Informants and their partners agreed that social risks vary little across adulthood, but they disagreed in terms of recreational, financial, and health risks, and in terms of the decisions they would make. CONCLUSION: Family members, partners, and close friends are sensitive to vulnerabilities of their social partners, but in some domains and according to their partners' age they perceive a greater (or smaller) risk than their partners perceive for themselves. In situations requiring surrogate decision-making, people may decide differently from how their social partners would decide for themselves.

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Perception of risk for older adults: Differences in evaluations for self vs. others and across risk domains

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Abstract

Background and objectives: Proxy decision-making may be flawed by inaccurate perceptions of risk. This may be particularly true when older adults are the targets of the decisions, given the pervasive negative stereotypes about older adults. *Methods*: Study 1: 18- to 87-year-olds (as target persons) as well as one of their close social partners (as informants) reported on the risks they perceived for the target person in various life domains. Study 2 additionally explored potential differences in how people make risky decisions on behalf of younger and older adult targets. Younger (18–35 years) and older (60–81 years) adults (as target persons of the risk evaluations) as well as informants reported on risk perceptions and likelihood of risk-taking for health, financial, and social scenarios concerning the target persons. Congruence between self-rated and informant-rated risk perceptions and risk-taking were computed on a dyadic as well as group level. *Results*: Informants' risk perceptions were positively associated with the risks their partners perceived for themselves. Informants and their partners agreed that social risks vary little across adulthood, but disagreed for recreational, financial, and health risks, disagreeing also in the decisions they would make. *Conclusion*: Family members, partners, and close friends are sensitive to vulnerabilities of their social partners, but in some domains and according to their partners' age perceive greater (or less) risk than their partners perceive for themselves. In situations requiring surrogate decision-making, people may decide differently to how their social partners would decide for themselves.

50 Perception of risk for older adults: The role of perspective and life domain

51 As people age, they face risky decisions in a range of domains, such as health,
52 recreation, finance, and social environment. However, risk in these domains may not change
53 uniformly across adulthood. For example, the social risk of speaking in public may be similar
54 across adulthood, whereas swimming in rapid waters may pose greater risk for older adults who
55 typically have lower muscle strength. There also exist individual differences in the factors
56 associated with risk at any given age. For instance, while the average 75-year-old may have
57 lower muscle strength than the average 45-year-old, a specific 75-year-old's muscle strength
58 may be higher than that of her 45-year-old daughter. People likely possess unique insight into the
59 personal risks they face (e.g., informed by perceptions of their own frailty).

60 Yet, in many instances, such as when decision-making capacity is impaired in older age,
61 family members, partners, or close friends are called to act as surrogate decision-makers and to
62 decide partially or entirely on behalf of others. In fact, nearly half of hospitalized patients aged
63 65 years and older receive at least some surrogate involvement in decisions about their health
64 care and treatment [1]. Close to one quarter of the medical decisions that involve a surrogate are
65 made with no involvement from the patient [1]. Especially in old age, important financial
66 decisions, including changes to wills and inheritance, as well as social decisions, such as whether
67 to live independently or in a residential community, often involve surrogates in the decision-
68 making process [2,3]. To address this important issue, the current research investigates the risks
69 perceived and decisions made by younger and older adults for themselves and compares these
70 with the risks perceived and decisions made for them by familiar others, including family
71 members, partners, and close friends.

Older adults have typically been shown to be more cautious than younger adults when judging risks for themselves [4,5]. However, a wealth of research now suggests that risk-taking is to some extent domain-specific: Risk-taking in some domains (e.g., health) is less strongly associated with risk-taking in other domains (e.g., financial) than with risk-taking for other activities in the same domain [6, 7]. To capture the domain-specific nature of risk-taking, Weber and colleagues developed the Domain-Specific Risk-Taking scale (DOSPERT; [6, 8]. In their analysis of the revised DOSPERT, Highhouse and colleagues ([9]; see also [10]) discovered that risk-taking as assessed by the DOSPERT scale comprises both a general risk factor and domain-specific tendencies. Rolison, Hanoch, Wood, and Pi-Ju [11] employed the revised DOSPERT to measure risk-taking across adulthood. Their study uncovered age trends specific to each of the DOPSERT domains. Health risk-taking reduced smoothly with age, whereas recreational risk-taking reduced more steeply in early adulthood. Financial risk-taking declined more sharply in later life and risk-taking in the social domain actually increased slightly from younger to middle adulthood, before decreasing sharply in older adulthood.

Are there differences in how people perceive their own risk in various domains in younger and older age from how others perceive the risks for them? Some research suggests that people may be reasonably accurate at perceiving risks specific to a person whom they know well. Clinical tools for the assessment of vulnerabilities in older age have often recruited family members, partners, and close friends as knowledgeable informants. For example, the Social Vulnerability Scale (SVS) was developed as an informant scale to identify social vulnerabilities in older age, such as credulity and gullibility [12,13]. The SVS is designed as a clinical tool for identifying vulnerabilities among individuals aged 50 years or older and is completed by a knowledgeable informant (e.g., a family member) to circumvent issues associated with poorer

insight into one's own behavior in older age [13]. High scores on the SVS have been shown to predict neurological disease in older adults, suggesting that people may be reasonably good at judging the risks that are specific to a person they know well. Moreover, the use of surrogates to aid decision-making about people's medical care and treatment and their financial future and social environment rests on the assumption that people are sensitive to the risks faced by others.

Our current studies investigated if, and in what way, risk perceptions for social partners in different age groups (i.e., younger and older adults) differ from the risk that those social partners perceive for themselves and whether this depends on the domain of risk. In Study 1, we asked younger, middle-aged, and older participants about the risks they perceived for themselves and their likelihood of risk-taking for several activities and behaviors in multiple domains. Each participant also nominated a person who knew them well to report on the risks they perceived for their nominating partner. In Study 2, we asked younger and older participants about their risk perceptions and likelihood of risk-taking for a smaller number of more detailed scenarios and asked their nominated partners to report how likely they would be to take the same risk on behalf of their nominating partner in addition to reporting the risks they perceived for their partner.

We anticipated differences between how people perceive risks for themselves to how those risks are perceived for them by others. Namely, people may have specific insight into their own risks, which may lead them to perceive different risks to those judged for them by others. Fragility, dependency, physical handicaps, and need of care are prominent in stereotypes about older people [14,15]. The influence of aging stereotypes can even resist contradictory experience. For example, caregivers in nursing homes use baby talk regardless of the physical and cognitive abilities of older residents [16]. Thus, based on aging stereotypes, people may infer greater risks for older adults even despite contradictory knowledge about their strengths. We

hypothesize that if informants base their perceptions solely on age-related stereotypes, they will perceive greater risk for their older social partners in all domains than their partners perceive for themselves, making more cautious decisions on their behalf. However, aging stereotypes, internalized during childhood, can become self-stereotypes in older age. In fact, older adults have been shown to display negative aging self-stereotypes as implicit attitudes that are as negative as those possessed by people of younger ages [17]. Negative aging self-stereotypes can negatively impact on cognitive abilities, such as memory performance [18]. Thus, older adults may perceive themselves as more vulnerable than they truly are, leading to a higher estimate of their risks compared to estimates by their close social partners and consequently to more cautious decision-making.

Study 1

Methods

Participants

One hundred thirty adults aged 18-87 years (M = 47.80; SD = 21.07; 63% female), were recruited from the local community. All participants aged 60 years or older passed the mini mental state examination as a screen for cognitive impairment [19] and none were excluded. Regarding education, 21% indicated high school as their highest level of education, 34% had completed college or third level education (e.g., A-levels, diploma), 33% had completed an undergraduate degree, and nine 7% indicated that they had completed post-graduate education (e.g., Master's degree, PhD degree). Each participant nominated a family member, partner, or close friend aged 35-60 years (M = 46.19; SD = 8.27; 62% female) to report on the risks they perceived for their nominating partner. We targeted the 35-60 year age range in order to restrict the age-related variance in risk perceptions in the informant sample, and because it seems the

most likely age of potential proxy decision-makers for both young and older adults who may not be able to make decisions for themselves. The informants had known their nominating partner at least one year (M = 26.91; SD = 14.02). The majority were parents (30%), sons or daughters (24%), spouses or partners (15%) siblings (6%), nieces or nephews (4%), or other family members (4%), and the remaining were close friends or work colleagues (18%). Regarding education, 20% indicated high school as their highest education level, 37% indicated that they had completed college or third level education, 33% had completed an undergraduate degree, and 8% indicated a post-graduate degree as their highest level of education. Ethical approval for the research protocol was granted by the institution ethics review board.

Materials and Procedure

Self-ratings: All participants received the same 16 items divided equally into four domains, including the recreational (e.g., '*Going camping in the wilderness*'), social (e.g., '*Admitting your tastes are different from those of a friend*'), financial (e.g., '*Betting on the outcome of a sporting event*'), and health (e.g., '*Taking a ride on a motorcycle without wearing a helmet*') domains (see Appendix A for the full list of items). We did not include the ethical domain in our survey as the items were not suitable for use with informants (e.g., '*Having an affair with a married man/woman*'). Some of the survey items were similar or identical to those in the revised DOSPERT [20]. Other items were generated for our present purposes to ensure that they were suitable for a diverse age range. For example, rather than ask participants about '*Piloting a small plane*' or '*Bungee jumping off a tall bridge*,' which did not seem suitable for older adults, we asked them about '*Starting a new intense exercise routine*' and '*Going winter swimming in an icy lake*.' Items such as '*Starting a new career in your mid-thirties*' in the social domain of the revised DOSPERT were replaced with less age-specific items, such as '*Speaking*

164 *at a debate club in your local community*.' Some DOSPERT items in the financial domain
165 referred to income (e.g., '*Betting a day's income on the outcome of a sporting event*') and were
166 made more generic ('*Betting on the outcome of a sporting event*'), and items in the health
167 domain that required specific abilities (e.g., '*Riding a motorcycle without a helmet*') were made
168 more general ('*Taking a ride on a motorcycle without wearing a helmet*').[1,2]

169 Participants received a printed booklet containing the 16 items. They rated their risk-
170 taking likelihood and perceived risk in separate sections of the booklet. The items were presented
171 in a randomly generated order within each section, but in the same order for each participant.
172 The order of sections was randomly generated for each participant. In the risk-raking likelihood
173 section, participants were asked to '*indicate the likelihood that you would engage in the*
174 *described activity or behavior if you were to find yourself in that situation*.' Participants provided
175 their ratings on a 7-point scale, ranging -3 ('Extremely unlikely'), 0 ('Not sure'), to 3
176 ('Extremely likely'). Responses were summed across items to calculate likelihood ratings for
177 each risk domain, where higher ratings indicate a higher likelihood of risk taking. In the risk
178 perception section, they were told:

179 *'People often see some risk in situations that contain uncertainty about what the outcome*
180 *or consequences will be and for which there is the possibility of negative consequences.*
181 *However, riskiness is a very personal and intuitive notion, and we are interested in your*
182 *gut level assessment of how risky each situation or behavior is for you.'*

[1] Some items underwent further modification following initial pilot testing.
[2] As some of the scale items were modified for our purposes, we conducted an exploratory factor analysis (FA) on self-rated risk perceptions using Varimax rotation to test its factor structure. The FA extracted four factors based on a criterion of eigenvalues > 1 and explained 59% of the variance. All 4 recreational items loaded most heavily on Factor 1; 3 of the 4 social items loaded most heavily on Factor 2 (item 3 [see Appendix A for item description] loaded on Factor 1); 3 of the 4 financial items loaded most heavily on Factor 3 (item 3 loaded on Factor 1); and 2 of the 4 health items loaded most heavily on Factor 4 (items 2 and 4 loaded on Factor 1). Thus, our FA broadly confirmed the four-domain structure for our modified version of the DOSPERT (see Appendix B for more details).

Participants were then asked to '*indicate how risky you perceive each situation for you personally if you were to find yourself in that situation*' on a 7-point scale, ranging 0 ('*Not at all risky*') to 6 ('*Extremely risky*'). Risk perception ratings for each risk domain were calculated by averaging responses across items, where higher ratings indicate higher perceived risk. The participant instructions were similar to those used in the revised DOSPERT scale [20].

Informant ratings: The informants completed an online version of the risk perception section of the survey and were asked to rate the 16 items as they perceived them for their partner. This required slight amendments to the instructions, which instead read '*…we are interested in your gut level assessment of how risky each situation or behavior is for* [partner name].' and '*indicate how risky you perceive each situation would be for* [partner name] *if he/she were to find himself/herself in that situation*'. The online nature of the informant version enabled us to insert the partner's name in the amended text. Some of the scale items also required minor amendments (e.g., '*Admitting their tastes are different from those of a friend*') to reflect the informant's perspective. Participants provided their ratings on the same scale as self-rating participants.

Statistical analysis

To test for associations between the risks informants perceived for their partners and risks their partners perceived for themselves, we calculated Pearson *r* correlations between self-rated and informant-rated risk perceptions for each risk domain. To test whether informants' risk perceptions correlated more highly with their partners' risk perceptions for the same domain than for each other domain, we used the method proposed by Steiger [21, 22] for comparing dependent correlations, which involves comparing the correlation coefficients after applying Fisher's *r*-to-*z* transformation (see [22] for more details).

Domain differences in self-rated risk-taking likelihood were assessed with a one-way analysis of variance (ANOVA) on likelihood ratings, including domain (recreational, social, financial, health) as a repeated-measures factor. In the analysis of risk perceptions, we additionally included group (informant-ratings vs. self-ratings) in the ANOVA to test for group differences in risk perceptions.

To test for effects of the self-rating participant's age on their risk perceptions and the risk perceptions of their partner, we conducted a multiple regression analysis on risk perceptions in each domain. Age (as a continuous grand mean-centered predictor) and group (informant-ratings vs. self-ratings) were included as predictors in a first block (Model A). In a second block (Model B), an interaction term between age and group was included. In a final block (Model C), the interaction term was removed and a quadratic term for age was included to test for curvilinear effects of age on risk perception. The R^2 change for Models B and C was assessed in comparison with Model A. An α level of .05 was used in all analyses.

Results

Table 1 provides the Cronbach α scores, showing reasonable levels of internal consistency of the scales. The positive intercorrelations in self-rated risk-taking likelihood (and risk perception) indicate that greater risk-taking likelihood (risk perception) in each domain was associated with greater risk-taking likelihood (risk perception) in each other domain. Regarding informant ratings, the intercorrelations were all positive, indicating that informants' perceptions of greater risk for their partners in one domain were associated with greater perceived risk for their partners in other domains (Table 1).

As shown in Table 2, the risks informants perceived for their partner correlated with the risks their partner perceived for themselves in each domain.[3] In general, informants' risk perceptions also correlated more highly with their partner's risk perceptions for the same domain than with their partners' risk perceptions in other domains (Table 2).

Table 3 provides the mean group risk-raking likelihood and risk perception ratings. Self-rated risk-taking likelihood was highest in the health domain, followed by the financial, social, and recreational domains. A significant effect of domain was confirmed by the analysis of variance (ANOVA; $F(3,387) = 57.06$, $p < .001$, $\eta^2 = .31$). Regarding risk perception, informants perceived similar risks for their partners as their partners perceived for themselves ($F(1,258) = 0.11$, $p = .74$). Moreover, informants and their self-rating partners agreed about domain differences in risk, perceiving the greatest risk in the health domain, followed by the financial, recreational, and social domains. The ANOVA confirmed a significant effect of domain ($F(3,774) = 466.10$, $p < .001$, $\eta^2 = .64$) and showed no significant interaction.

Do people perceive greater (or less) risk according to the other's age? Table 4 provides the results of the regression analyses on the risk perceptions of self-ratings participants and informants. In the recreational, financial, and health domains, group (informant- vs. self-rating) interacted with the age of the self-rating participant.[4] This result suggests that in these domains the association between age and risk perception differed between self-rating participants and

[3] We additionally conducted multiple linear regression analyses on partners' self-rated risk perceptions in each domain to test for moderating effects of informants' relationship with their partner (parent vs. other relations, adult children vs. other relations) and the absolute age difference between informants and their partners on the association between informant- and self-rated risk perceptions. Parent (vs. other relations) interacted with informant risk perceptions in the recreational domain (see Appendix C), such that the association between informant- and self-ratings was weaker for parent informants. There were no other significant interactions.

[4] According to a post-hoc power analysis with significance level (α) = .05 and effect sizes based on our regression analysis for each domain, our power to detect the significant age by group interaction was .95 in the recreational domain, .996 in the financial domain, and .74 in the health domain. Therefore, we had sufficient power to detect a significant age by group interaction on 74% to 99% of occasions.

informants (Model B; Table 4). In the recreational domain, self-rated risk perceptions increased linearly with age, whereas the risk perceptions of informants followed a quadratic trend with the age of their self-rating partner (Model C; Table 4).

Figure 1 provides the best fitting slopes for age on risks perceptions. Informants perceived that recreational risk for others vary little from age 18-56 years, but from thereon increase with age. Consequently, informants perceived more risk for their youngest partners than their partners perceived for themselves, and perceived slightly less risk for their oldest partners than their oldest partners perceived for themselves. In the financial domain, participants perceived greater risk for themselves as their age advanced from 18-87 years. Conversely, their informants did not perceive greater risk as their partner's age increased. Consequently, informants perceived greater risk for their younger partners and lower risk for their older partners than their partners perceived for themselves. Similarly, participants perceived greater health risks for themselves as their age increased from 18-87 years, whereas their informants did not perceive greater risk as their partner's age increased. In the social domain, self-rating participants and their informants perceived a gradual increase in risk with age.

In sum, informants perceived greater risks for younger social partners in the recreational, financial, and health domains than their partners perceived for themselves. Moreover, informants perceived less risk for their older social partners in these domains than their partners perceived for themselves. These findings speak against our hypothesis that people base their judgments of others primarily on age-related stereotypes, which would have led to a higher risk evaluation for older adults. Rather, our findings resonate with our alternative hypothesis that older adults estimate their own risks as higher than perceived by their social

partners. This may indicate that older adults evaluate their own risks in line with aging self-stereotypes.

Study 2

In Study 1, family members, partners, work colleagues, and close friends acting as informants perceived risk differently depending on the age of the social partners and differently to how their social partners perceived risk for themselves. Given that these results have potential implications for proxy decision-making, we were interested if these differences also bear out for making risky decisions on the behalf of social partners. Study 2 addressed this question by further exploring potential differences between how people of different ages make risky decisions and how their informants would make decisions for them (i.e. proxy decision-making).

Methods

Participants

A sample of 106 adults (53 younger adults, 18–35 years, M = 21.76 years, SD = 4.75; 62% female; 53 older adults, 60–81 years, M = 69.11 years; SD = 5.36; 55% female) were recruited from the local community. All older adults passed the mini mental state examination as a screen for cognitive impairment [19] and none were excluded. Regarding education, 15% indicated high school as their highest level of education, 17% had completed college or third level education, 58% had completed an undergraduate degree, and 10% indicated post-graduate education as their highest level of education. Self-rating participants nominated a family member, partner, or close friend aged between 35-60 years (M = 47.62; SD = 7.44; 64% female) to report on their nominating partner. Informants had known their nominating partner at least one year (M= 27.05; SD = 13.32). The majority were parents (40%), sons or daughters (29%), spouses or partners (15%), siblings (3%), or other family members (4%), and the remaining were

289 friends or work colleagues (10%). Regarding education, 18% indicated high school as their
290 highest education level, 23% had completed college or third level education, 44% had completed
291 an undergraduate degree, and 12% indicated a post-graduate degree as their highest level of
292 education. Ethical approval for the research protocol was granted by the institution ethics review
293 board.

294 *Materials and Procedure*

295 *Self-ratings*: We designed 12 decision scenarios, divided equally into the health,
296 financial, and social domain (Appendix D). Each scenario asked participants to make a decision
297 for themselves. We also asked informants to make decisions on behalf of their partner. We did
298 not include items in the recreational domain (e.g., "*Going camping in the wilderness*") as people
299 typically engage in such activities for personal pleasure, and thus, it may be difficult for
300 informants to imagine making such decisions on behalf of their partner. The scenarios were
301 provided on separate pages of a booklet. Participants indicated their likelihood of deciding in
302 favor of the decision option described in the scenario on a 7-point scale, ranging -3 ('*Extremely*
303 *unlikely*'), 0 ('*Not sure*'), to 3 ('*Extremely likely*'). Participants also rated the risks they perceived
304 for the decision option on a 7-point scale, ranging 0 ('*Not at all risky*') to 6 ('*Extremely risky*').

305 *Informant-ratings*: Informants received altered versions of the 12 scenarios, which
306 instead asked for decisions on behalf of their partner (Appendix D). The scenarios were provided
307 on separate pages of a booklet. The partner's name was inserted into each scenario. Informants
308 their likelihood of deciding in favor of the decision option on behalf of their partner and rated the
309 risks they perceived for their partner.

310 *Statistical analysis*

As in Study 1, we calculated Pearson *r* correlations to test for associations between informants' risk perceptions and risks their partners perceived for themselves. Group differences (informant-rating vs. self-rating) and domain differences (social, financial, health) in risk perceptions and risk-taking likelihood were assessed with two-way analyses of variance (ANOVA), including group as a between-subjects factor and domain as a repeated-measures factor. As in Study 1, to test for effects of the self-rating participant's age on their risk perceptions and the risk perceptions of their partner, we conducted a multiple regression analysis on risk perceptions in each domain. Age (older vs. younger) and group (informant-ratings vs. self-ratings) were included as predictors in a first block (Model A). An interaction term between age and group was included in a second block (Model B). We conducted the same regression model to assess self-rated and informant-rated risk-taking likelihood.

Results

The Cronbach α scores showed reasonable levels of internal consistency for most of the scales (Table 5). The intercorrelations in risk-taking were positive and significant for self-ratings only between the health and financial domains and for informant-ratings only between the financial and social and financial and health domains. This may reflect the contextual nature of the scenarios, due to their detailed descriptions, which may have increased the specificity of risk-taking across domains. The intercorrelations in risk perception across domains were in general positive and significant. The risk perceptions of informants correlated with their partner's risk perceptions in the financial domain ($r = .22, p = .02$), but not in the social ($r = .05, p = .61$), or health domains ($r = -.05, p = .59$).[5] There were no significant correlations across domains. The

[5]As in Study 1, we additionally conducted multiple linear regression analyses on partners' self-rated risk perceptions to test for moderating effects of informants' relationship with their partner and the absolute age difference between informants and their partners. These analyses yielded no significant moderating effects of relationship or informant-partner age differences on the association between informant- and self-rated risk perceptions (Appendix C).

low correlations between the risk perceptions of informants and their partners may reflect the contextual nature of the scenarios, which may have led to more idiosyncratic responding to the current scenarios compared to the DOSPERT in Study 1.

Informants rated a lower likelihood of taking a risk on behalf of their partners than self-rating participants indicated for themselves (Table 6). An analysis of variance (ANOVA) confirmed a significant effect of group (informant-rating vs. self-rating; $F(1,212) = 4.41$, $p = .04$, $\eta^2 = .02$) on likelihood ratings. Informants and self-rating participants showed similar trends in risk-taking likelihood across domains, reporting highest risk-taking likelihood in the social domain, followed by the health and financial domains (Table 6). The ANOVA showed a significant effect of domain ($F(2,424) = 137.20$, $p < .001$, $\eta^2 = .39$), but no interaction. Regarding risk perceptions, informants perceived lower risks for their partner than self-rating participants perceived for themselves (Table 6), which was confirmed by a significant effect of group in the ANOVA on risk perceptions ($F(1,212) = 8.03$, $p = .005$, $\eta^2 = .04$). Informants and self-rating participants agreed about domain differences in risk, perceiving greatest risk in the financial domain, followed by the health and social domains (Table 6). The ANOVA showed a significant effect of domain ($F(2,424) = 211.20$, $p < .001$, $\eta^2 = .50$), but no interaction.

Table 7 shows the regression analyses on risk-taking likelihood. The age of the self-rating participant interacted with informant-rating versus self-rating in the financial and health domains, but not in the social domain (Model B; Table 7). With advancing age, self-rating participants rated lower risk-taking likelihood in the financial and health domains (Figure 2). Conversely, informants were not influenced by their partners' age. We tested for effects of age separately for self-ratings and informant-ratings. These analyses confirmed an effect of age on

self-ratings in the financial (β = -.50, p < .001) and health (β = -.46, p < .001) domains, but not on informant-ratings in the financial (β = -.01, p = .94) and health (β = .04, p = .70) domains.

Table 7 provides the results of the regression analyses on risk perceptions. Age of the self-rating participant interacted with informant-ratings versus self-ratings in the financial domain (Model B; Table 7).[6] Self-rating participants, but not informants, perceived greater financial risk in older age (Figure 2). Conversely, self-rating participants and informants both perceived greater health risk in older age, which was confirmed by significant main effect of age and no significant interaction between age and informant-ratings versus self-ratings in the regression analysis (Model B; Table 7). Conversely, in the social domain, there was no significant effect of age on risk perceptions (Model B; Table 7).

General Discussion

How do we perceive risks for others as they age? Do we generally believe that older adults are more vulnerable across different life domains or are we, as we are for ourselves, sensitive to differences in heightened risks across domains? The central finding of the current studies is that the deviations of risk perceived for oneself and by others differ for younger and older age groups and across life domains: in the recreational, financial, and health domains, social partners believe that younger adults are more prone to risks than younger adults perceive for themselves, and that older adults are less prone to risks than older adults perceive for themselves. This concerns the group level. On the dyadic level, people were in fairly good agreement with their social partners about the risks their partners faced.

[6]According to a post-hoc power analysis with significance level (α) = .05 and effect sizes based on our regression analysis for each domain, our power to detect the significant age by group interaction on likelihood ratings was .99 in the financial domain and .98 in the health domain and on risk perceptions was .74 in the financial domain. Thus, we had sufficient power to detect a significant age by group interaction on 74% to 99% of occasions.

374 Previous work has relied heavily on gambling tasks as a method for studying age-
375 related differences in risk taking [23]. Although gambling tasks provide valuable insights into
376 behavior, research has revealed domain-specificity in risk taking [11,20]. Risk taking may
377 comprise both a general factor that is common across domains, but differs from one person to
378 another, and a domain-specific factor that differs from one domain to another [9]. Our current
379 research revealed a four-domain structure to the scale we used to assess risk perceptions (see
380 Appendix B), confirming the existence of domain-specificity in perceptions of risk. Yet, risk
381 perceptions correlated highly across domains, indicative of a domain-general component of risk
382 perception (Table 1). Domain-specificity in risk raises important questions about whether age
383 differences are independent of context. The aim of our studies was to explore whether family
384 members, partners, and close friends acting as informants perceive greater age-related risks as
385 people perceive for themselves. If older adults perceive greater risk in some domains than in
386 others because they are sensitive to their own vulnerabilities, then these vulnerabilities may also
387 be perceptible to their family members, partners, and close friends. In fact, social partners have
388 often been used as informants in clinical assessments of social vulnerabilities in older age
389 [12,13]. Further, surrogate decision making for others about their medical treatment, finance, and
390 social environment rests on the assumption that people can judge risk accurately for others.
391 Using a novel methodological approach, we asked informants to rate the risks they perceived for
392 their nominating partner.

393 In Study 1, the risks participants perceived for themselves were strongly associated with
394 the risks perceived for them by their informants. Informants also agreed with their partners about
395 domain differences in risk. In Study 1, both informants and self-rating participants perceived risk
396 to be greatest in the health domain, followed by the financial, recreational, and social domains.

In Study 2, both groups perceived the decision-making scenarios to be most risky in the financial domain, followed by the health and social domains. However, while informants and their partners agreed about domain differences in risk, informants disagreed with their partners about how these risks change across adulthood. In the recreational domain, the risk perceptions of self-rating participants increased linearly with age from youngest to oldest adults. Conversely, informants perceived that risk for their partners changed little until 56 years, whereupon it was perceived to increase sharply with advancing age. Informants were sensitive to greater potential risks of engaging in recreational activities in older age. Moreover, informants perceived that their younger partners were more at risk when engaging in recreational activities than their younger partners perceived for themselves. This finding dovetails with reports of heightened impulsivity and sensation seeking in younger adulthood [24]. Sensation seeking is also linked to recreational risk taking in younger adulthood [25]. For example, Pizam et al. [26] found that when on a leisure trip, university students who scored high in combined risk-taking and sensation seeking were more likely to engage in risky recreational activities, such as hiking, camping, and open water swimming. Thus, younger adults perhaps misjudge the risks they face by underestimating their physical vulnerabilities.

Informants and their partners also disagreed about how financial risks change across adulthood (Figures 1 & 2). Informants perceived less financial risk for their older partners than their partners perceived for themselves. Study 2 further revealed that while participants were less likely to take a financial risk for themselves as their age increased, risk-taking of informants on behalf of their partners was not influenced by their partners' age. Financial advisors often recommend to older adults that they be prudent in their financial investments, as a loss to savings in later life could take many years to recover [27]. We speculate that older adults may be very

cautious in their financial decision-making, maybe even overestimating their vulnerabilities in financial contexts. Indeed, while some of the financial items we used in Study 1 and some of the financial scenarios in Study 2 concerned investments of income and savings, others described betting on a sporting event or using a credit card to make an online payment. Our findings seem to reflect a general tendency toward caution in financial contexts with advancing age, at least in comparison with the views of others. This is in line with the finding that older adults are less willing than younger adults to take risks on a range of monetary gambling tasks [4, 23, 28-31], although such tasks typically involve gambling on small and inconsequential monetary gains and losses (for a discussion of this issue see [32]).

In Studies 1 and 2, participants perceived greater health risks for themselves in older age. While informants also perceived greater health risks for their older partners in Study 1, they did not perceive significantly greater risks for their older partners in the more detailed scenarios in Study 2. However, there was some suggestion in Study 2 that participants perceived slightly more risk for themselves in older age than their partners perceived for them (Figure 2). Moreover, in Study 2, older adults were less likely than younger adults to take a health risk on their own behalf, but informants did not differ in their decision-making on behalf their younger and older partners. Together, these findings suggest that in the health domain people may be highly sensitive to their own health-related vulnerabilities. Indeed, many older adults choose not to renew their driver license, despite being unimpaired [33]. While health authorities strongly recommend daily physical activity in older age, many older adults feel that they are too physically vulnerable to engage in fitness activities [34]. Thus, overly cautious behavior has serious potential consequences for health and well-being in older age. Reduced mobility, which

may result from feelings of vulnerability, can lead to social isolation, which is associated with poor physical health [35] as well as loneliness and depression [36].

While informants and self-rating participants disagreed about how risks change across adulthood in some domains, they agreed that social risks differed little with age. The items we used in the social domain included admitting one's tastes differ from those of an authority figure or person of influence (Study 1) or sharing one's views with a journalist on a controversial issue (Study 2). As discussed earlier, with advancing age some situations can pose greater risk than others. However, informants and self-rating participants agreed that social risks do not increase in older age. Furthermore, in the social domain, informants reported that they were equally likely to take a social risk on behalf of their partners as their partners were to take a social risk for themselves.

Our findings have implications for research on age-related stereotypes. This field of enquiry has shown that older adults are perceived as fragile, dependent, physically handicapped, and in need of care [14,15]. These negative stereotypes have been shown to influence people's perceptions of older adults regardless of the target's actual physical or cognitive abilities [16]. Hence, we expected that middle-aged informants would employ negative aging stereotypes, perceiving their older social partners as more vulnerable and at risk than their partners perceive for themselves. Yet, informants in our study actually perceived less risk for their older social partners in the recreational, financial, and health domains than their partners perceived for themselves. This indicates that aging stereotypes did not lead to exaggerated perceptions of vulnerability in older age. Moreover, on a dyadic level, informants' risk perceptions were positively associated with the risk perceptions of their partners, indicating that informants had similar perceptions of their partners' vulnerabilities as their partners had for themselves.

Therefore, when judging their older social partners' risks, people in younger age ranges seemingly do not draw solely upon broad age-related stereotypes but draw upon their personal knowledge of their partner.

Our studies cannot assess whether informants were more (or less) accurate than their self-rating social partners in judging the risks they face. However, our finding that older adults perceived greater risk for themselves in some domains than informants perceived for them suggests that older adults may draw on aging self-stereotypes. Previous research has shown that negative aging stereotypes can be internalized as early as in childhood and in later life re-emerge as self-stereotypes [17]. Negative aging self-stereotypes (e.g., that older people have poor memory), can even have detrimental effects on cognitive abilities in older age [18]. It is possible that older adults in our studies perceived, due to negative aging self-stereotypes of frailty, that they are more vulnerable, and thus, at greater risk than they truly are. Therefore, older adults may overestimate their vulnerabilities and risks in some domains life. This could have serious real-life implications as overly cautious behavior is associated with missed opportunities, which can lead to poorer physical health and well-being [35,36].

The current research also has limitations. First, we asked participants to report on their own risk behavior, rather than directly measure risk-taking. As our current interest was domain-specificity of risk perceptions across adulthood, we targeted self-reported behaviors in multiple domains. In Study 1, we based our survey items on those of the revised DOSPERT, which has been shown to predict real-world behavior [37]. In Study 2, we devised decision-making scenarios with the intention that they were applicable to people of a broad age range. While some of the sub-scales demonstrated reasonable Cronbach α levels of internal consistency, others exhibited poorer levels, indicating that the items of some domains were less closely related. We

488 observed the lowest levels in the health domain in Study 2. Therefore, the broad domains we
489 focused on presently should be treated with some caution as their breadth may conceal multiple
490 sub-domains. For example, the health domain may comprise distinct medical, dietary, and
491 exercise sub-domains.

492 Second, although our findings suggest that family members, partners, and close friends
493 when acting as informants were able to detect vulnerabilities in their partner, some
494 vulnerabilities (e.g., physical risks, '*Going camping in the wilderness*') may be more detectable
495 to informants than others (e.g., health-related risks, '*Using a sunbed in a tanning studio*').
496 Studies have shown that self-other agreement about personality traits depends on the
497 observability or visibility of a person's characteristics [38]. Moreover, some vulnerabilities may
498 not be detectable even to oneself, such as the risk one might face when '*Walking home alone at*
499 *night in an unsafe area of town*.' The degree to which pairs of individuals are well acquainted
500 and their relationship with each other also affects self-other agreement [39,40]. We chose
501 informants who were highly familiar with their nominating partner. Informants had known their
502 self-rating partners on average for more than 25 years in both studies, and the majority were
503 family members. However, there was some indication in our data that acquaintanceship was
504 important for informants' perceptions of their social partners. In Study 1, informants who were
505 parents of their social partner exhibited weaker associations between their risk perceptions and
506 their partners' risk perceptions in the recreational domain. Thus, extending previous research
507 [39,40], acquaintanceship may be an important mechanism underpinning people's perception of
508 the risks faced by others. Had we recruited informants who were less well acquainted with their
509 social partner, we may have observed a much weaker association between their risk perceptions
510 and perhaps greater reliance by informants on aging stereotypes. An implication of this finding is

that when using clinical tools to assess the vulnerabilities of older adults, such as the Social Vulnerability Scale (SVS, [12,13]), clinicians and researchers need to be cognizant that the informant's relation to the target older adult could influence their degree of insight into the target's vulnerabilities.

Finally, we asked whether people are sensitive to age-specific risks that others face. To answer this question, we compared the risk perceptions and risk behavior of self-rating participants with reports provided on their behalf by a nominated partner. It is important to note, however, that self-related risk perceptions are highly personal. Particular events or outcomes can be marked by varying levels of affect that are person-specific and the positive and negative feelings that people associate with particular outcomes of decision options inform their risk perceptions [41]. Moreover, positive and negative personal experiences (e.g., receiving a scornful criticism) can mark future decision options (e.g., disagreeing with an authority figure) with positive or negative emotions that influence decision-making [42]. We acknowledge that such influences of affect on self-related risk perceptions presumably would not be visible or observable to others. Yet, despite the personal relevance of risk perceptions, our findings showed that in many instances informants' risk perceptions were strongly associated with those of their partners, indicating that informants were able to detect risks faced by their partners.

Conclusion

As people grow older, they perceive greater risk in some domains than in others, leading to domain-specificity in risk-taking differences with age. Family members, partners, and close friends are sensitive to the vulnerabilities of others, but in some domains, perceive greater risk in younger age and less risk in older age than others perceive for themselves. When decision-making capacity is impaired, such as in older age, some high-risk decisions about healthcare and

534 treatment and important financial and social decisions are made not by oneself, but by others.
535 Our findings suggest that for decisions involving risk, others may decide differently to how their
536 social partners would decide for themselves. As informants perceived less risk in older age than
537 older adults perceived for themselves, middle-age persons acting as surrogate decision-makers
538 may make riskier decisions on another's behalf than their elderly family members, partners, and
539 close friends would be willing to make for themselves.
540

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Table 1. Study 1: Intercorrelations across domains for self-rated risk-taking likelihood and self-rated and informant-rated risks

	Self-rating: Likelihood			
	Recreational	Social	Financial	Health
Recreational	(.65)			
Social	.67**	(.60)		
Financial	.68**	.63**	(.60)	
Health	.46**	.60**	.58**	(.50)
	Self-rating: Risk Perception			
	Recreational	Social	Financial	Health
Recreational	(.78)			
Social	.53**	(.64)		
Financial	.60**	.44**	(.68)	
Health	.59**	.40**	.52**	(.69)
	Informant rating: Risk Perception			
	Recreational	Social	Financial	Health
Recreational	(.68)			
Social	.45**	(.60)		
Financial	.29**	.28**	(.58)	
Health	.47**	.35**	.41**	(.64)

Note. *$p \leq .05$, **$p \leq .01$, 2-tailed significance test of the Pearson *r* correlation coefficient compared to zero. Cronbach α values are in parenthesis.

Table 2. Study 1: Correlations between informant-rated and self-rated risks

	Informant rating			
Self-rating	Recreational	Social	Financial	Health
Recreational	.46**	.26**†	.17*††	.26**
Social	.31**	.46**	.11††	.22*
Financial	.36**	.17††	.35*	.21*
Health	.19*††	.14††	.15††	.25**

Note. *$p \leq .05$, **$p \leq .01$, 2-tailed significance test of the Pearson *r* correlation coefficient compared to zero; $^{\dagger}p \leq .05$, $^{\dagger\dagger}p \leq .01$, 2-tailed of the Pearson *r* correlation coefficient informant-ratings and self-ratings of the same domain compared to self-ratings of each other domain

Table 3. *S*tudy 1: Mean group self-rated risk-taking likelihood and self-rated and informant-rated risk perceptions for each domain

	Self-rating: Likelihood	Self-rating: Risk Perception	Informant rating-Risk Perception
	M (*SD*)	*M* (*SD*)	*M* (*SD*)
Recreational	-1.57 (1.25)	3.59 (1.40)	3.46 (1.23)
Social	-1.05 (1.20)	2.12 (1.12)	2.21 (1.05)
Financial	-0.81 (1.41)	4.18 (1.14)	4.18 (1.00)
Health	-0.31 (1.13)	4.82 (1.02)	4.72 (0.99)

Table 4. Study 1: Multiple linear regression analyses on self-ratings and informant-ratings of risk perception

Model	Parameter	Recreational Domain	Social Domain	Financial Domain	Health Domain
Model A	Age	.50**	.21**	.33**	.23**
	Group	-.05	.04	.00	-.05
	R^2	.25**	.22**	.11**	.06**
Model B	Age	1.07**	.48*	1.11**	.69**
	Group	-.05	.04	.00	-.05
	Age by group	-.60**	-.29	-.83**	.49*
	R^2 change	.036**	.008	.068**	.024*
Model C	Age	.65** (.30**)	.20**	.56** (.07)	.39** (.06)
	Group		.04		
	Age^2	.01 (.25**)	.10	-.06 (.06)	-.08 (.17)
	R^2 change	.000 (.059**)	.009	.003 (.003)	.006 (.030)

Note. *$p \leq .05$, **$p \leq .01$; The R^2 change for Models B and C is in comparison with Model A. For Model C, values not in parenthesis = self-ratings and value in parenthesis = informant ratings.

Table 5. Study 2: Intercorrelations across domains for self-rated and informant-rated risk-taking likelihood and risk perceptions

	Self-rating: Likelihood		
	Social	Financial	Health
Social	(.41)		
Financial	.08	(.77)	
Health	.12	.33**	(.37)
	Informant-rating: Likelihood		
	Social	Financial	Health
Social	(.45)		
Financial	.19*	(.62)	
Health	.11	.24*	(.18)
	Self-rating: Risk Perception		
	Social	Financial	Health
Social	(.71)		
Financial	.09	(.73)	
Health	.22*	.22*	(.38)
	Informant-rating: Risk Perception		
	Social	Financial	Health
Social	(.62)		
Financial	.29**	(.62)	
Health	.30**	.27**	(.47)

Note. *$p \leq .05$, **$p \leq .01$, 2-tailed significance test of the Pearson *r* correlation coefficient compared to zero. Cronbach α values are in parenthesis.

Table 6. Study 2: Mean group self-rated and informant-rated risk-taking likelihood and risk perceptions for each domain

	Self-rating: Likelihood	Informant-rating: Likelihood	Self-rating: Risk Perception	Informant-rating: Risk Perception
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Social	0.88 (1.10)	.77 (1.13)	2.66 (1.14)	2.32 (1.06)
Financial	-.70 (1.53)	-1.14 (1.19)	4.40 (1.00)	4.11 (0.97)
Health	0.36 (1.27)	.18 (1.10)	3.57 (0.96)	3.38 (0.93)

Table 7. Study 2: Multiple linear regression analyses on self-ratings and informant-ratings of risk-raking likelihood and risk perception

		Risk-taking likelihood			Risk perception		
Model	Parameter	Social Domain	Financial Domain	Health Domain	Social Domain	Financial Domain	Health Domain
Model A	Age	.07	-.28**	-.23**	.01	.13	.15*
	Group	-.05	-.16*	-.07	-.15*	-.15*	-.10
	R^2	.01	.10**	.06**	.01	.04*	.03*
Model B	Age	.08	-1.10	-1.02**	.20	.65**	.36
	Group	-.04	-.98**	-.86**	.04	.37	.11
	Age by group	-.02	1.19**	1.15**	-.27	-.76**	-.31
	R^2 change	.000	.075**	.069**	.004	.030**	.005

Note. *$p \leq .05$, **$p \leq .01$; The R^2 change for Model B is in comparison with Model A.

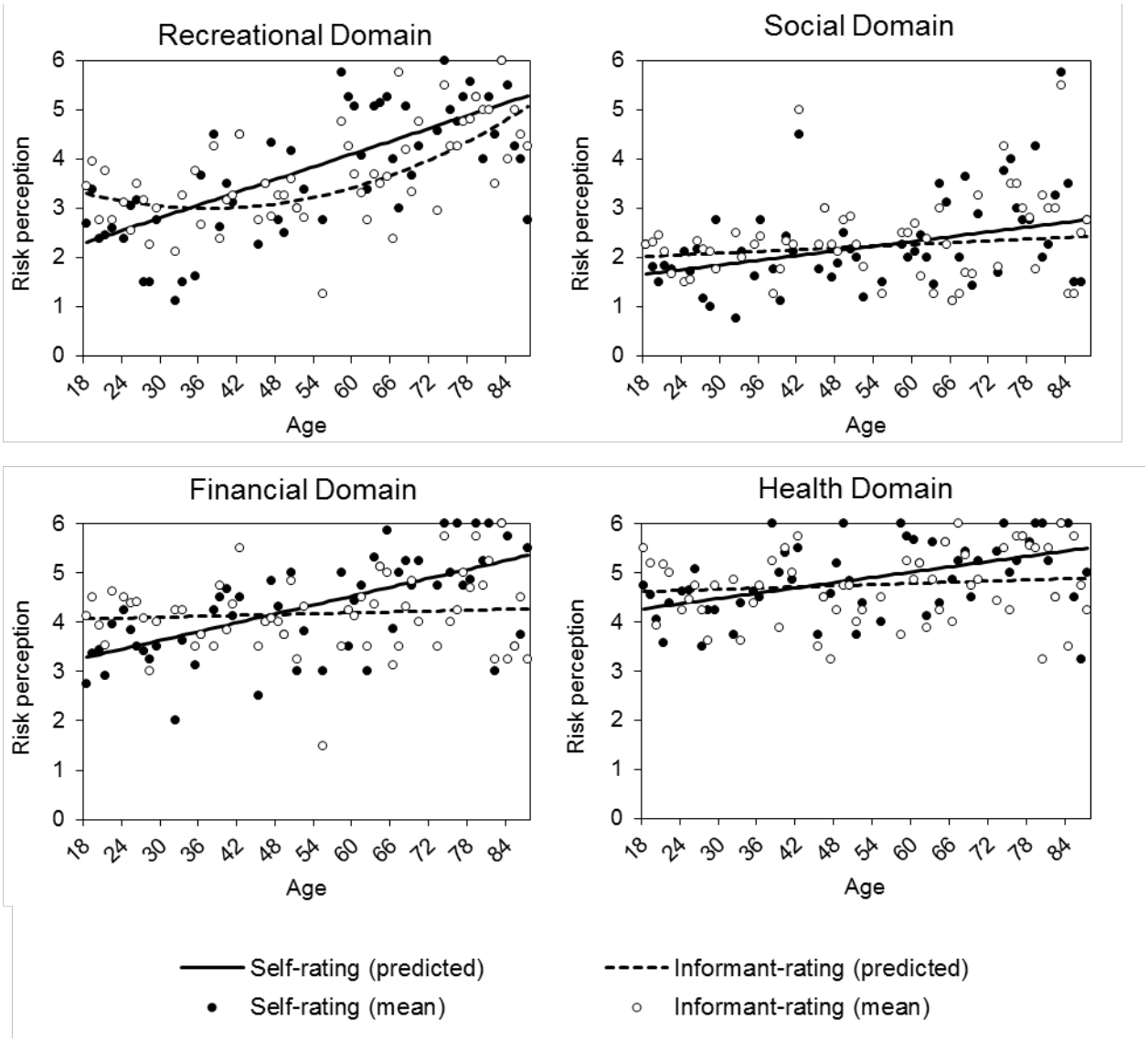
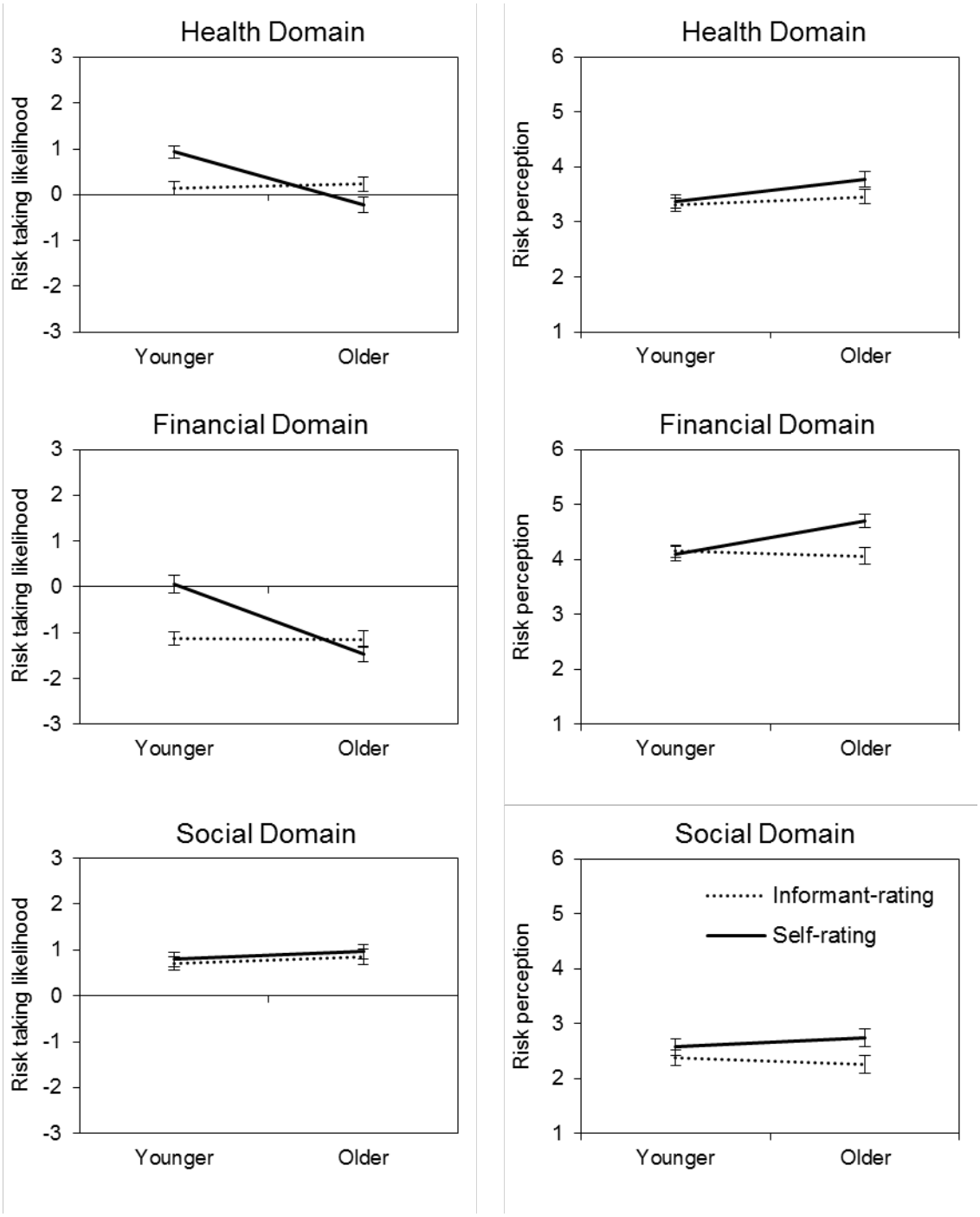


Figure 1. *Self-rated risk perceptions and informant ratings with age in Recreational, Social, Financial, and Health domains. Predicted slopes were estimated using a linear regression analysis. Dots indicate the mean group values at each individual age containing at least one participant.*



763

764 Figure 2. *Mean group self-rated and informant-rated risk perceptions and risk behavior with age*

765 *in the health, financial, and social domains. Error bars indicate the 95% confidence intervals.*

766

767 **APPENDIX A**

Table A1: Questionnaire items

Risk Domain	Questionnaire Item
Recreational	1. Going camping in the wilderness
	2. Starting a new intense exercise routine
	3. Going winter swimming in an icy lake
	4. Traveling alone in an unfamiliar country
Social	1. Admitting your tastes are different from those of a friend
	2. Disagreeing with an authority figure or person of influence on a major issue
	3. Moving to a city far away from your close friends and family
	4. Speaking at a debate club in your local community
Financial	1. Betting on the outcome of a sporting event
	2. Investing in a very speculative stock on the stock market
	3. Using your credit card to pay for an item on an unfamiliar website
	4. Investing a considerable amount of your income or savings in a potentially highly lucrative new start-up firm
Health	1. Taking a ride on a motorcycle without wearing a helmet
	2. Using a sunbed in a tanning studio
	3. Driving a car without wearing a seat belt
	4. Walking home alone at night in an unsafe area of town

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APPENDIX B

Our exploratory factor analysis (FA) was conducted on self-rated risk perceptions in Study 1 using Varimax rotation to test the scale's factor structure. Four factors were extracted based on a criterion of eigenvalues > 1 and together explained 59% of the variance. Regarding the individual factors, Factor 1 explained 22%, Factor 2 explained 14%, Factor 3 explained 12%, and Factor 4 explained 12% of the variance. Table B1 provides the rotated factor loadings for the individual scale items. The factor loadings broadly confirm the four-domain structure of the scale, such that the individual scale items generally loaded most heavily on their respective factors.

Table B1: Exploratory factor analysis on self-rated risk perceptions in Study 1

Scale item	Factor 1	Factor 2	Factor 3	Factor 4
Recreational domain				
1. Going camping in the wilderness	.78			
2. Starting a new intense exercise routine	.63			
3. Going winter swimming in an icy lake	.70			
4. Traveling alone in an unfamiliar country	.72			
Social domain				
1. Admitting your tastes are different from those of a friend		.78		
2. Disagreeing with an authority figure or person of influence on a major issue		.77		
3. Moving to a city far away from your close friends and family	.63			
4. Speaking at a debate club in your local community		.73		
Financial domain				
1. Betting on the outcome of a sporting event		.44	.46	
2. Investing in a very speculative stock on the stock market			.85	
3. Using your credit card to pay for an item on an unfamiliar website	.41			.30
4. Investing a considerable amount of your income or savings in a potentially highly lucrative new start-up firm	.34		.79	
Health domain				
1. Taking a ride on a motorcycle without wearing a helmet				.79
2. Using a sunbed in a tanning studio	.48			
3. Driving a car without wearing a seat belt				.85
4. Walking home alone at night in an unsafe area of town	.58			

781 **APPENDIX C**

782 We conducted multiple linear regression analyses on self-rated risk perceptions in each
783 domain to test for moderating effects of informants' relationship with their partner (parent vs.
784 other relations, adult children vs. other relations) and the absolute age difference between
785 informants and their partners on the association between informant- and self-rated risk
786 perceptions. Tables C1 (Study 1) and C2 (Study 2) provide the results of these analyses. The
787 only significant interaction was between parent (vs. other relations) and informant risk
788 perceptions in the recreational domain in Study 1, indicating that the association between
789 informant- and self-ratings was weaker for parent informants.

790

Table C1. Study 1: Multiple linear regression analyses on self-rated risk perceptions to assess moderating effects of informants' relationship with their partner and the absolute age difference between informants and their partners on the association with informant-rated risk perceptions

Parameter	Recreational Domain	Social Domain	Financial Domain	Health Domain
Risk perception: Informant	.49**	.34**	.21*	.28*
Parent vs. other relations	-.43**	-.16	-.47**	-.43**
Adult child vs. other relations	.13	.01	.03	-.06
Absolute age difference	.17	.19	.22*	.21
Risk perception: Informant by Parent vs. other relations	-.25**	-.03	.02	-.11

Risk perception: Informant by Adult child vs. other relations	-.10	.11	.15	.02
Risk perception: Informant by Absolute age difference	.01	.08	.05	-.04

Note. *$p \leq .05$, **$p \leq .01$.

Table C2. Study 2: Multiple linear regression analyses on self-rated risk perceptions to assess moderating effects of informants' relationship with their partner and the absolute age difference between informants and their partners on the association with informant-rated risk perceptions

Parameter	Social Domain	Financial Domain	Health Domain
Risk perception: Informant	.21	.27	-.27
Parent vs. other relations	.20	-.15	.17
Adult child vs. other relations	.33*	.07	.24
Absolute age difference	-.09	.05	.02
Risk perception: Informant by Parent vs. other relations	-.12	-.13	.17
Risk perception: Informant by Adult child vs. other relations	-.13	.05	.24
Risk perception: Informant by Absolute age difference	.06	-.11	.02

Note. *$p \leq .05$, **$p \leq .01$.

APPENDIX D

Study 2: Decision making scenarios

Health domain:

Scenario 1: Self-rating

"Imagine that you have been involved in an accident and you are currently in hospital. You injured your leg in the accident and one of your big toes is showing serious signs of infection. The doctors caring for you explain that two options are available. One option is to remove your infected toe, eliminating any risk of the infection spreading to other parts of the body. A second option involves treating the infection with an antibiotic, which has a high chance of curing the infection. However, if the antibiotic treatment fails, you might have to lose your entire foot. The doctors warn that a decision must be made immediately. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of the antibiotic treatment rather than amputating the infected toe?"

Risk perception: "How risky do you believe it would be for you to undergo the antibiotic treatment rather than have your infected toe amputated?"

Scenario 1: Informant rating

"Imagine that [name] has been involved in an accident and is currently in hospital. [He/She] is unconscious, but [his/her] condition is expected to improve and [he/she] will regain consciousness soon. However, [name] injured [his/her] leg in the accident and one of [his/her] big toes is showing serious signs of infection. The doctors caring for [name] explain that two options are available. One option is to remove [his/her] infected toe, eliminating any risk of the infection spreading to other parts of the body. A second option involves treating the infection with an antibiotic, which has a high chance of curing the infection. However, if the antibiotic treatment fails, [name] might have to lose [his/her] entire foot. The doctors warn that they cannot wait for [name] to wake up and a decision must be made immediately. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of the antibiotic treatment rather than amputating the infected toe?"

Risk perception: "How risky do you believe it would be for [name] to undergo the antibiotic treatment rather than have [his/her] infected toe amputated?"

Scenario 2: Self-rating

"Imagine that you need to have a wisdom tooth removed. You would prefer to undergo the treatment using a general rather than a local anaesthetic as you suffer from severe dental related anxieties. Your dentist explains that general anaesthetic is used rarely because of a higher chance of side effects, which can include feeling sick and vomiting, shivering and feeling cold, and damage to the mouth or teeth. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of general anaesthetic?"

Risk perception: "How risky do you believe it would be for you to use general anaesthetic?"

Scenario 2: Informant rating

"Imagine that [name] needs to have a wisdom tooth removed. [He/She] would prefer to undergo the treatment using a general rather than a local anaesthetic as [he/she] suffers from severe dental related anxieties. [His/Her] dentist explains that general anaesthetic is used rarely because of a higher chance of side effects, which can include feeling sick and vomiting, shivering and feeling cold, and damage to the mouth or teeth. After consulting [his/he] dentist, [name] still feels unsure and confused about what to do. As you know [him/her] well, [he/she] asks you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of general anaesthetic?"

Risk perception: "How risky do you believe it would be for [name] to use general anaesthetic?"

Scenario 3: Self-rating

"Imagine that you have been undergoing drug treatment for a medical condition. Unfortunately, the drug treatment has not proven successful and your condition is becoming worse. Your doctor would like to conduct further examinations to understand the cause of your condition. One option is to conduct a range of blood tests that are relatively safe and that are not likely to cause any further medical complications, but which could miss the cause of your condition and may delay proper treatment. An alternative option is an invasive test that involves surgery. While the surgery has a range of possible complications, it is also your best chance to get the correct diagnosis of your condition. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of the surgery?"

Risk perception: "How risky do you believe it would be for you to undergo the surgery?"

Scenario 3: Informant rating

"Imagine that [name] has been undergoing drug treatment for a medical condition. Unfortunately, the drug treatment has not proven successful and [his/her] condition is becoming worse. [His/Her] doctor would like to conduct further examinations to understand the cause of [his/her] condition. One option is to conduct a range of blood tests that are relatively safe and that are not likely to cause any further medical complications, but which could miss the cause of [his/her] condition and may delay proper treatment. An alternative option is an invasive test that involves surgery. While the surgery has a range of possible complications, it is also [his/her] best chance to get the correct diagnosis of [his/her] condition. However, the drug treatment that [name] is currently receiving is known to have mild cognitive effects, meaning that you must consent to the medical procedure on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of the surgery?"

Risk perception: "How risky do you believe it would be for [name] to undergo the surgery?"

Scenario 4: Self-rating

"Imagine that you would like to get involved in a local fund raising event. The event involves going winter swimming in an icy lake and is expected to raise a considerable sum of money for a charity that you feel very strongly about. The event organizer has asked you for a final decision on whether you will take part. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of taking part in the fund raising event?"

Risk perception: "How risky do you believe it would be for you to take part in the fund raising event?"

Scenario 4: Informant rating

"Imagine that [name] would like to get involved in a local fund raising event. The event involves going winter swimming in an icy lake and is expected to raise a considerable sum of money for a charity that [name] feels very strongly about. The event organizer has asked [name] for a final decision on whether [he/she] will take part. [name] feels that [he/she] has thought too much about this decision and that [he/she] can no longer decide [himself/herself]. This may not be typical of [name], but [he/she] trusts you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] taking part in the fund raising event?"

Risk perception: "How risky do you believe it would be for [name] to take part in the fund raising event?"

Financial domain:

Scenario 1: Self-rating

"Imagine that you recently inherited a considerable sum of money from a close friend and you have been considering whether to save the money or invest it in the stock market. You receive a call from your financial advisor recommending that you invest your inheritance in a new stock that has just entered the market and that is highly likely to yield a very large return. Your financial advisor explains that a decision must be made immediately. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of investing in the stock?"

Risk perception: "How risky do you believe it would be for you to invest in the stock?"

Scenario 1: Informant rating

"Imagine that [name] recently inherited a considerable sum of money from a close friend and has been considering whether to save the money or invest it in the stock market. You receive a call from [his/her] financial advisor recommending that [name] invests [his/her] inheritance in a new stock that has just entered the market and that is highly likely to yield a very large return. The financial advisor explains that a decision must be made immediately. However, [name] is currently on holiday and you have no way of contacting [him/her], meaning you must decide on [his/her] behalf. Anticipating this possibility, [name] has asked that you decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] investing in the stock?"

Risk perception: "How risky do you believe it would be for [name] to invest in the stock?"

Scenario 2: Self-rating

"Imagine that you are approached by a friend who works as a bookmaker (someone who handles the placement of bets). The friend shares with you some inside knowledge about a horse that will race later today. If you bet on the horse you have a very high chance of winning, but the minimum bet is £200. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of betting on the horse race?"

Risk perception: "How risky do you believe it would be for you to bet on the horse race?"

Scenario 2: Informant rating

"Imagine that [name] is approached by a friend who works as a bookmaker (someone who handles the placement of bets). The friend shares with [name] some inside knowledge about a horse that will race later today. If [name] bets on the horse [he/she] has a very high chance of winning, but the minimum bet is £200. [name] feels that [he/she] has thought too much about this decision and that he can no longer decide [himself/herself]. This may not be typical of [name], but [he/she] trusts you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] betting on the horse race?"

Risk perception: "How risky do you believe it would be for [name] to bet on the horse race?"

Scenario 3: Self-rating

"Imagine that you have been considering investing some of your income or savings in a new start-up firm in the local area. You have been seeking financial advice and your financial advisor contacts you to make you aware of a highly lucrative new start-up firm that is highly likely to yield a large return. A decision must be made today about whether to invest in the firm. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of investing in the new start-up firm?"

Risk perception: "How risky do you believe it would be for you to invest in the new start-up firm?"

Scenario 3: Informant rating

"Imagine that [name] has been considering investing some of [his/her] income or savings in a new start-up firm in the local area. [He/She] has been seeking financial advice and [his/her] financial advisor contacts [him/her] to make [him/her] aware of a highly lucrative new start-up firm that is highly likely to yield a large return. A decision must be made today about whether to invest in the firm. However, [name] is taking part in an all-day event and cannot be contacted, meaning that you must decide on [his/her] behalf. Anticipating this possibility, [name] has asked that you decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] investing in the new start-up firm?"

Risk perception: "How risky do you believe it would be for [name] to invest in the new start-up firm?"

Scenario 4: Self-rating

"Imagine that you have recently been learning to play poker online using an official internet gambling website. You have been playing for small amounts of money and have been very successful. You are now offered the opportunity to raise your bets and invest £200. You are likely to win more than you invest. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of making the bet?"

Risk perception: "How risky do you believe it would be for you to make the bet?"

Scenario 4: Informant rating

"Imagine that [name] has recently been learning to play poker online using an official internet gambling website. [He/She] has been playing for small amounts of money and has been very successful. [name] is now offered the opportunity to raise [his/her] bets and invest £200. [He/She] is likely to win more than [he/she] invests. However, [name] feels that [he/she] has thought too much about this decision and that he can no longer decide [himself/herself]. This may not be typical of [name], but [he/she] trusts you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] making the bet?"

Risk perception: "How risky do you believe it would be for [name] to make the bet?"

Social domain:

Scenario 1: Self-rating

"Imagine that you recently shared your views with a journalist on a controversial social issue. You have expressed strong views on the subject and you are keen that your opinion reaches the public domain. You receive a call from the journalist explaining that the local magazine containing your comments will go to print today. The journalist would like a final approval to include your comments as the controversy around the issue has escalated in the past couple of days. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of publishing your comments?"

Risk perception: "How risky do you believe it would be for you to have your comments published?"

Scenario 1: Informant rating

"Imagine that [name] recently shared [his/her] views with a journalist on a controversial social issue. [name] has expressed strong views on the subject and is keen that [his/her] opinion reaches the public domain. You receive a call from the journalist explaining that the local magazine containing [name]'s comments will go to print today. The journalist would like a final approval to include [name]'s comments as the controversy around the issue has escalated in the past couple of days. However, [name] is currently on holiday and you have no way of contacting [him/her], meaning you must decide on [his/her] behalf. Anticipating this possibility, [name] has asked that you decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of publishing [name]'s comments?"

Risk perception: "How risky do you believe it would be for [name] to have his comments published?"

Scenario 2: Self-rating

"Imagine that you have been involved in a dispute with a neighbour who recently has been playing loud music late at night. One option available to you is to make a formal complaint to the local authorities, but this could create further conflict between you and your neighbour. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of making a formal complaint?"

Risk perception: "How risky do you believe it would be for you to make a formal complaint?"

Scenario 2: Informant rating

"Imagine that [name] has been involved in a dispute with a neighbour who recently has been playing loud music late at night. One option available to [name] is to make a formal complaint to the local authorities, but this could create further conflict between [name] and [his/her] neighbour. [name] feels that [he/she] has thought too much about this decision and that [he/she] can no longer decide [himself/herself]. This may not be typical of [name], but [he/she] trusts you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] making a formal complaint?"

Risk perception: "How risky do you believe it would be for [name] to make a formal complaint?"

Scenario 3: Self-rating

"Imagine that you recently contributed to an impromptu debate in your local community. The debate attracted media attention as some of the issues raised are controversial. A journalist would like to use some parts of the debate, including comments made by you, in a televised segment in the local news that will be broadcasted later today. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of using your comments in the local news?"

Risk perception: "How risky do you believe it would be for you to have your comments used in the local news?"

Scenario 3: Informant rating

"Imagine that [name] recently contributed to an impromptu debate in [his/her] local community. The debate attracted media attention as some of the issues raised are controversial. A journalist would like to use some parts of the debate, including comments made by [name], in a televised segment in the local news that will be broadcasted later today. However, [name] is taking part in an all-day event and cannot be contacted, meaning that you must decide on [his/her] behalf. Anticipating this possibility, [name] has asked that you decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of using [name]'s comments in the local news?"

Risk perception: "How risky do you believe it would be for [name] to have [his/her] comments used in the local news?"

Scenario 4: Self-rating

"Imagine that you have had an argument with someone working at the checkout in the local supermarket. You feel that the checkout worker was very rude and worry that this could become an issue if you are served by the same individual in the future. You are considering whether to raise the issue with the store manager. Please imagine that you must make a decision."

Likelihood rating: "How likely would you be to decide in favour of raising the issue with the store manager?"

Risk perception: "How risky do you believe it would be for you to raise the issue with the store manager?"

Scenario 4: Informant rating

"Imagine that [name] tells you that [he/she] had an argument with someone working at the checkout in the local supermarket. [name] feels that the checkout worker was very rude and worries that this could become an issue if [he/she] is served by the same individual in the future. [name] is considering whether to raise the issue with the store manager. However, [he/she] feels that [he/she] has thought too much about this decision and that [he/she] can no longer decide [himself/herself]. This may not be typical of [name], but [he/she] trusts you to decide on [his/her] behalf. Please imagine that you must make a decision on behalf of [name]."

Likelihood rating: "How likely would you be to decide in favour of [name] raising the issue with the store manager?"

Risk perception: "How risky do you believe it would be for [name] to raise the issue with the store manager?"